

PRIMARY AND SECONDARY HAZARDS OF ZINC PHOSPHIDE
TO NONTARGET WILDLIFE - A REVIEW OF THE LITERATURE

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Abstract:

Zinc phosphide is an inorganic acute rodenticide. When zinc phosphide reacts with water and hydrochloric acid in the gastrointestinal tract of poisoned animals it forms the highly toxic gas phosphine. Zinc phosphide is relatively nonselective and has been used to control a variety of rodent pests. This paper provides a review of the toxicity, primary hazards, and secondary hazards of zinc phosphide.

At least 61 acute oral toxicity studies, representing 28 species of mammals and 16 species of birds, have been conducted on zinc phosphide. Based on these toxicity data, zinc phosphide is toxic to both mammals and birds. It is several times more toxic to rodents than to carnivores. Of the bird species tested, waterfowl and gallinaceous birds appear the most sensitive, with geese being the most susceptible of all wild birds to primary zinc phosphide poisoning. Some passerines, such as red-winged blackbirds, also appear relatively sensitive. Several factors, including prior exposure to untreated bait, nutritional condition of the bird, availability of alternate food sources, and ability to regurgitate treated baits influence the magnitude of primary hazards.

Many secondary toxicity studies have been conducted on a variety of mammalian predators, raptors, and reptiles. These studies generally indicate low risk of secondary toxicity. Because zinc phosphide does not accumulate in muscle tissue of poisoned animals, no true secondary poisoning occurs. Death caused by eating animals poisoned with zinc phosphide results from primary ingestion of zinc phosphide remaining in the gastrointestinal (GI) tract. The low risk of secondary intoxication with zinc phosphide can also be attributed to the following factors: 1) mammalian predators are less susceptible to zinc phosphide than other species; 2) the strong emetic action of zinc phosphide reduces secondary risks; and 3) most animals refuse to eat the GI tract of poisoned animals.

Field studies to determine effects of zinc phosphide on nontarget wildlife have generally found no significant effects, but under certain circumstances operational zinc phosphide applications have resulted in mortality of nontarget wildlife. Most of these incidents have involved misuse of zinc phosphide, or application rates and concentrations that were much higher than current labelled rates.